

The Transparent Solution: Biodiesel's Growing Role



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Biodiesel is a simple and effective alternative to Petroleum Diesel

- ✓ **Runs in Diesel Engines**
- ✓ **Reduces Emissions**
- ✓ **Reduces Oil Dependence**
- ✓ **Meets Federal Standards**
- ✓ **Stimulates Our Economy**



Biodiesel Runs in Any Diesel Engine Without Modification

- Specify D6751-02
- Specify cloudpoint
- Use 20% blend, B20
- Does not Void Warranty
- Pay .20- .25 per gallon
- Pour into tank
- Schedule early filter change
- Resume business as usual



Rudolph Diesel



How does Biodiesel Perform? Better than Petroleum Diesel Fuel

- High Cetane
- High lubricity
- Comparable BTU content
- Readily mixes with diesel



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What does World Energy know about biodiesel's current role?

- Supplier for most American fleets
- Largest biodiesel capacity in the U.S.
- Strategically allied with Gulf Oil
- Partnered with BP (regionally)
- Nation-wide distribution network
- Longest cold-weather experience



What Is Driving the Switch to Biodiesel?



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Opportunity to Reduce Petroleum Dependence

- Displace 302 million barrels of crude oil by 2016
- Displace 2.9 billion barrels of crude from 2002-2016
- Reduce imports from 70 percent to 65 percent by 2016

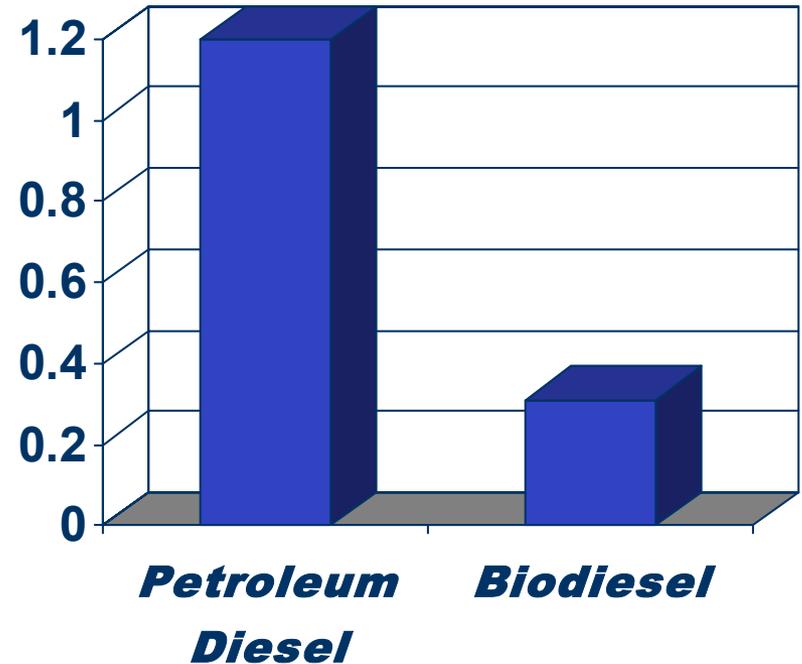


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Truly Renewable Power Source

- Biodiesel yields 3.2 units of fuel energy for every unit of fossil fuel consumed in its life cycle.
- Petroleum diesel yields 0.83 units of fuel energy per unit of fossil energy consumed.

MJ Fossil Used per MJ Fuel



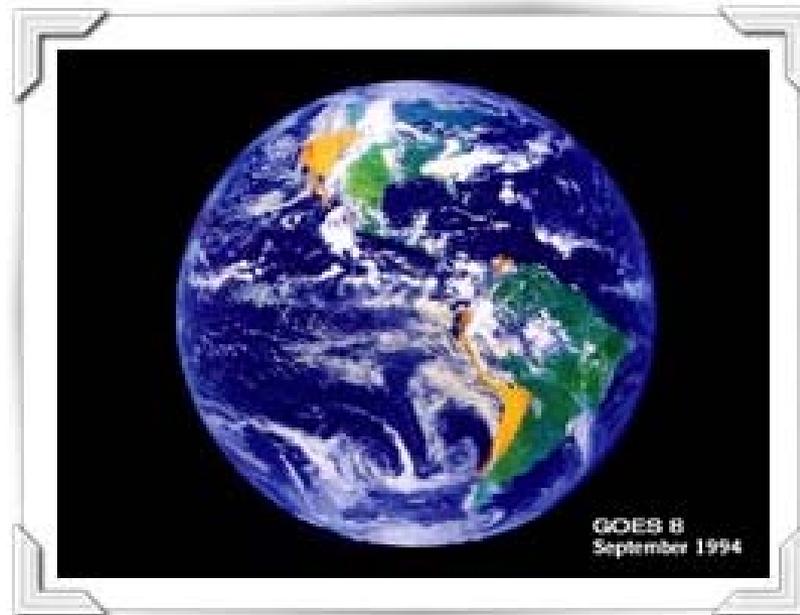
Regulatory Compliance

- EPAAct:
 - 2250 gallons of B20 = 1 vehicle (\$450 at .20)
- Limited to 50 percent of compliance
- Executive Order 13149
 - 20 percent petroleum reduction



Slow Down Global Warming

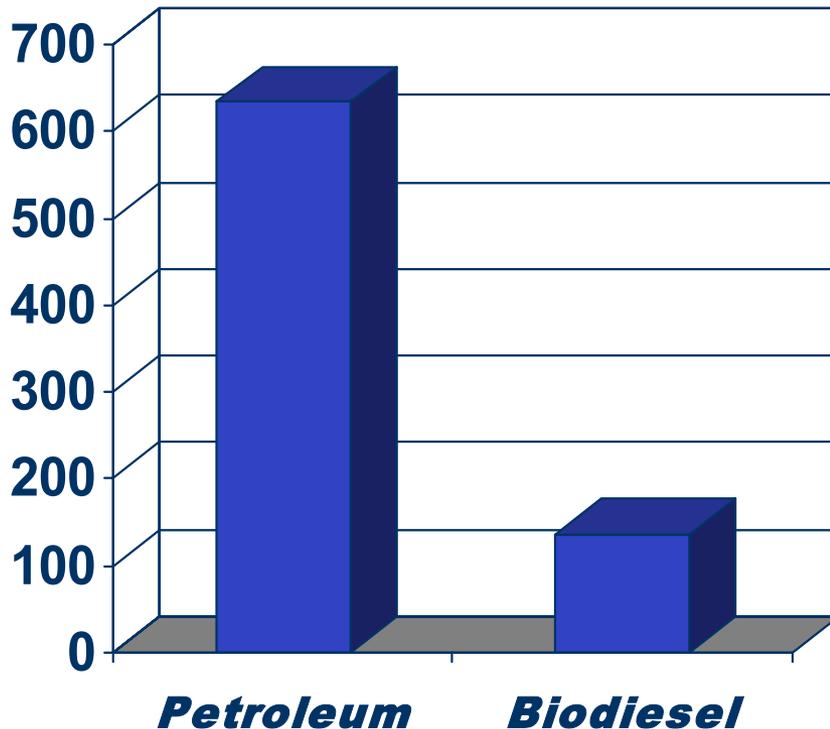
- 78 percent reduction per US Department of Energy and US Department of Agriculture



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Recycles CO₂

g CO₂ per bHP-h of work



- Biodiesel emits 78.5% less CO₂ than petroleum diesel
- Blends exhibit proportionate benefits
 - B20 emits 15.66% less CO₂ than petroleum diesel

Stimulate the US Farm Economy

- Soybean oil demand increase from 51 million bushels to 318 million bushel
- \$7.8 billion reduction in direct payments to farmers
- \$63.4 billion improvement in US trade deficit
- \$100 billion increase in net farm income



Meet EPA 2006 Standards for Clean Diesel...

- Soy Envirodiesel at 0-1 ppm sulfur.
- Zero aromatics
- Specify 15 ppm standard



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...Without Sacrificing Lubricity

Lubricant	<u>HFFR</u> (microns)
None	536
1% Biodiesel	321
Additive 1	338
Additive 2	398
Additive 3	343
Additive 4	348
Additive 5	515



Emissions Reductions

B20 emissions reductions compared to petroleum diesel:

- Carbon monoxide -20%
- Unburned hydrocarbons -30%
- Particulate matter -22%
- Sulfates -20%
- NPAH -50%
- Mutagenicity -20%

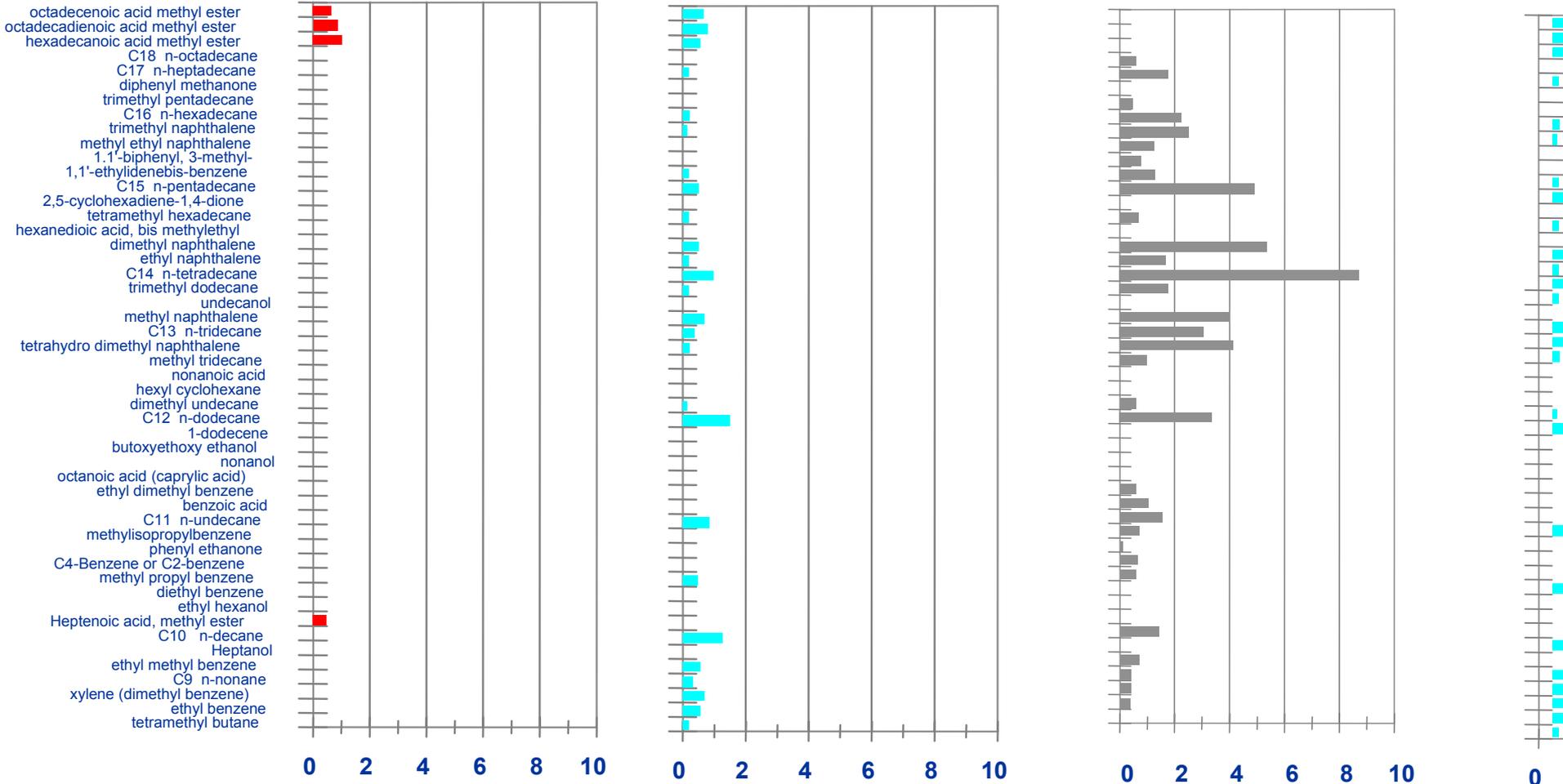


HEAVY HC SPECIATION - CUMMINS N14 ENGINE

B100

B20

2D



Tier I Health Effects Data
supplied by SWRI, 1997-8

RELATIVE EMISSION RATE (MG/HP-HR)

NOx Reductions

- Fuel alone is insufficient
- Compatible with All Clean Diesel Technologies
- Amenable to timing retards, EGR, retrofits



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Public Health Risk Reduction

- Lovelace Research Institute 211(b) test results
- **NO** pronounced toxicity at any level (B100)
- **NO** mortality or clinical abnormality
- **NO** neurotoxic or internal pathologic response
- **NO** adverse effect on fertility and reproductive systems
- Corroboration of Tier I findings concerning decreased mutagenicity activity in living organisms



Pure Biodiesel is Safer to Drink, Burn and Spill

- B100 reduces acute toxicity to marine life by 20x
- Flashpoint exceeds 300 F
- Less Toxic than Table Salt
- B20 biodegrades twice as fast as petroleum diesel
- **B20 CONTAINS PETROLEUM AND REMAINS HAZARDOUS**



How do we Deliver? SUPPLY BULK BIODIESEL TO YOUR AREA.

- World Energy has multiple production facilities.
- All product meets ASTM biodiesel standards and is subject to World Energy Quality Control.
- Envirodiesel™ is transported in insulated, steam-coiled jumbo railcars to Rail Distribution Nodes.
- Diesel transport vehicles bring Envirodiesel™ to local Distribution Nodes.



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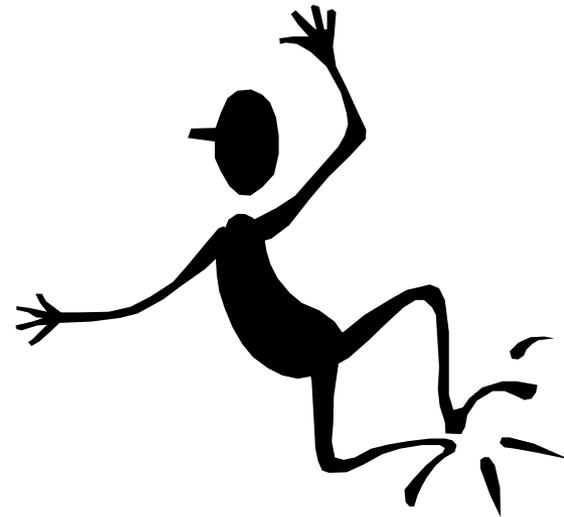
How do we Deliver? Partner with Local Distributors.

- World Energy partners with local distributors to make Envirodiesel™ available from distributors in your community who can serve you best.
- Local distributors follow World Energy handling and distribution guidelines to ensure top quality product.
- You purchase and receive only fully blended product as you need it.
- Blend rates are insured through dual meter slips.



How do we Deliver? According to Your Custom Requirements.

- World Energy is licensed to sell petroleum diesel in your state and can sell to you directly.
- World Energy has been awarded the national DESC contract and is registered as a federal vendor.
- World Energy can help guide you through federal and state red tape for procurement and reporting.
- World Energy can supply your existing contractor with biodiesel to fulfill your needs.



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Who is Already Using Biodiesel to Solve These Problems?

- Aspen
- Yellowstone NP
- Northstar at Tahoe
- Malmstrom AFB
- Glacier NP
- Breckenridge
- The US Post Office
- US Dept. of Agriculture
- North Carolina DOT



Who is Already Using Biodiesel to Solve These Problems?

- Commonwealth Edison
- The State of Delaware
- Alabama Power
- Georgia Power
- Reliant Energy
- Pacific Gas & Electric
- New Jersey Transit
- South West Ohio Transit



Who is Already Using Biodiesel to Solve These Problems?

- Transit of Northern Kentucky
- Austin Energy
- The State of Alabama
- Virginia DOT
- Peterson Air Force Base
- Camp Pendleton USMC
- Manhattan Post Office
- Pacific Waste



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Who is Already Using Biodiesel?

- State of Connecticut
- San Diego Gas & Electric
- Florida Power & Light
- Madison Gas & Electric
- Aspen
- The US Navy
- Duke Power
- San Luis Obispo Police



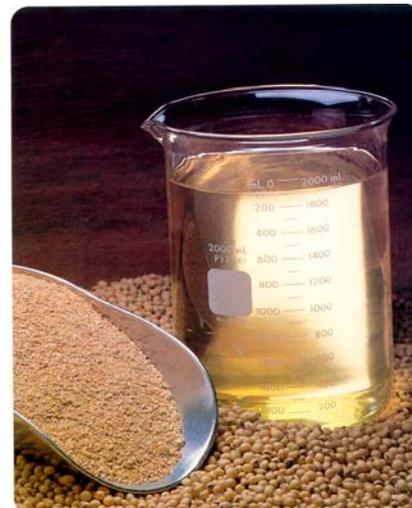
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- Randall Von Wedel, “Technical Handbook for Marine Biodiesel,” prepared for National Renewable Energy Laboratory, April 1999



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- Tier 2 Testing of Biodiesel Exhaust Emissions, conducted by Lovelace Respiratory Research Institute, May 2000



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